

REMARKS

Summary

New independent Claims 230, 234, 237, 238, 243, 244, 248, and 252 recite at least one feature not disclosed or suggested by the documents to Kiyozumi, Ishikawa, and Yabumoto. Therefore, should these claims be rejected over these documents?

Status of the claims

Claims 9, 28, and 150-229 have been canceled without prejudice. Claims 230-253 have been added. Claims 230, 234, 237, 238, 243, 244, 248, and 252 are independent.

Requested action

Applicants respectfully request the Examiner to reconsider and withdraw the outstanding rejections in view of the foregoing amendments and the following remarks.

Rejections

Claims 9, 28, and 150-229 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kiyozumi (JP 2-122355) and Ishikawa (U.S. Patent No. 4,902,146). Claims 9, 150-152, 154-158, 170-172, 174-178, 190-192, 194-198, 210-212, and 214-218 are rejected under 35 U.S.C. § 102(b) as being anticipated by Yabumoto (JP 3-63273954).

Response to rejections

In response, while not conceding the propriety of the rejections, Claims 9, 28, and 150-229 have been canceled without prejudice in favor of new Claims 230-253. Applicants submit

that newly added independent Claims 230, 234, 237, 238, 243, 244, 248, and 252 are allowable for the following reasons.

Independent Claim 230 relates to an information processing apparatus comprising a connection unit, arranged for connecting a detachable external device to the information processing apparatus, a recognition unit, arranged for recognizing connection of the external device to the information processing apparatus, a discrimination unit, arranged for discriminating a device type of the external device connected by the connection unit on the basis of data stored in the connected external device, and a loading unit, arranged for, in response to the recognition unit recognizing connection of the external device, loading a device driver program for controlling the connected external device from the external device via the connection unit or from a memory area provided in the information processing apparatus, on the basis of the device type discriminated by the discrimination unit.

By this arrangement, the information processing apparatus can control an external device connected to the apparatus using a device driver suitable for the type of external device that is connected using a limited memory and without requiring any additional effort of the user beyond attaching the external device to the apparatus.

In contrast, the patents to Kiyozumi, Ishikawa, and Yabumoto are not understood to disclose or suggest a loading unit, arranged for, in response to a recognition unit recognizing connection of an external device, loading a device driver program for controlling the connected external device from the external device via a connection unit or from a memory area provided in the information processing apparatus, on the basis of the device type discriminated by a discrimination unit, as recited by new Claim 230.

The failure of these references to disclose or suggest at least these features proves fatal to establishing a prima facie case of obviousness against Claim 230, since MPEP §2142, requires that:

To establish a prima facie case of obviousness... the prior art reference (or references when combined) must teach or suggest all the claim limitations.

For this reason, Claim 230 is allowable over these documents under 35 U.S.C. § 103.

In addition, the failure of these references to disclose or suggest at least these features also proves fatal to establishing anticipation of Claim 230 under 35 U.S.C. §102, since MPEP §2131 states:

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."

For this reason, Claim 230 is allowable over these documents under 35 U.S.C. § 102.

And since independent Claims 234 and 237 recite similar features, they are allowable for similar reasons.

Independent Claim 238 relates to an information processing apparatus comprising a discrimination unit, arranged for discriminating whether an external device is a first type of device in which a memory is provided for storing a device driver program for controlling the external device or a second type of device in which the memory is not provided, and a loading unit, arranged for loading the device driver program for controlling the external device from the memory provided in the external device if the discrimination unit discriminates that the external device is the first type of device.

By this arrangement, the information processing apparatus can control an external device connected to the apparatus using a device driver suitable for the type of external device that is

connected using a limited memory and without requiring any additional effort of the user beyond attaching the external device to the apparatus.

In contrast, the patents to Kiyozumi, Ishikawa, and Yabumoto are not understood to disclose or suggest a discrimination unit, arranged for discriminating whether an external device is a first type of device in which a memory is provided for storing a device driver program for controlling the external device or a second type of device in which the memory is not provided, and a loading unit, arranged for loading the device driver program for controlling the external device from the memory provided in the external device if the discrimination unit discriminates that the external device is the first type of device, as recited by new Claim 238.

For this reason, MPEP § 2142 and § 2131 mandate the allowance of Claim 238 over these patents. And since new independent Claims 243, 244, and 248 recite similar features, they are allowable for similar reasons.

Independent Claim 252 relates to a device detachably connected to an information processing apparatus, the device comprising a memory unit, arranged for storing information which indicates a device type of the device and storing a device driver program for controlling the device. The information processing apparatus discriminates the device type of the device on the basis of the information stored in the memory unit and loads the device driver program from the device into the information processing apparatus.

By this arrangement, the information processing apparatus can control the device connected to the apparatus using a device driver suitable for the type of external device that is connected using a limited memory and without requiring any additional effort of the user beyond attaching the external device to the apparatus.

In contrast, the patents to Kiyozumi, Ishikawa, and Yabumoto are not understood to relate to a device, detachably connected to an information processing apparatus, comprising a memory unit, arranged for storing information which indicates a device type of the device and storing a device driver program for controlling the device, the information processing apparatus discriminating the device type of the device on the basis of the information stored in the memory unit and loading the device driver program from the device into the information processing apparatus, as recited by Claim 252. For this reason, MPEP § 2142 and § 2131 mandate the allowance of Claim 252 over these patents.

The dependent claims are allowable for the reasons given with respect to the independent claims and because they recite features which are patentable in their own right. Individual consideration of the dependent claims is respectfully solicited.

Submission of translation

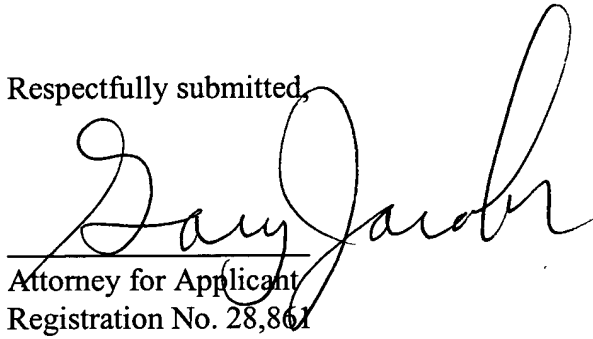
For the Examiner's convenience, attached is a translation of the Kiyozumi patent.

Conclusion

In view of the above amendments and remarks, the claims are now in allowable form. Therefore, early passage to issue is respectfully solicited.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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Specification

1. Title of the Invention

PACKAGE CONTROLLER

2. Claim

A package controller comprising:

a controller (4) including a CPU (1), a main storage (2) and a system bus (3);

a memory (6) in which a driver (7) is stored; and

a package (5) connectable to said controller (4) through said system bus (3),

wherein, when said package (5) is connected to said system bus (3), said CPU (1) transfers said driver (7) from said memory (6) to said main storage (2), and permits said driver (7) to render said package (5) active.

3. Detailed Description of the Invention

[Overview]

The present invention relates to a package controller having a line control function and a system interface function.

It is one objective of the invention to provide a package controller that, while a system is maintained active, can expand a package by a simple operation within a short period of time, and can utilize the system.

A package controller comprises:

a controller including a CPU, a main storage and a system bus;

a memory in which a driver is stored; and

a package connectable to the controller through the system

bus,

wherein, when the package is connected to the system bus, the CPU transfers the driver from the memory to the main storage, and permits the driver to render the package active.

[Industrial Field of Application]

The present invention relates to a package controller, and relates in particular to a package controller that has a line control function and a system interface function.

In the current data communication field, a communication network must be extended as the amount of data, the number of districts and the communication speed are increased. In this case, an increased number of lines and facilities is required, and the efficient utilization of a package (printed board) having both a line control function and a system interface function has been demanded.

[Description of Prior Art]

Fig. 3 is a schematic diagram showing an example conventional package controller.

A controller 4 comprises: a CPU 1 for controlling the entire system; a main storage 2, such as a RAM, used for storing various control instructions; a ROM 10, wherein a driver and a control program (not shown) are stored; and a system bus 3, which serves as a signal transmission path for the CPU 1, the main storage 2 and the ROM 10. A package 11 that performs a line control function or a system interface function includes a memory 12 and a control circuit (not shown). When the package 11 is attached to (inserted into) the controller 4, the memory 12 and the control circuit are

connected to the system bus 3.

The operation of the conventional package controller will now be described. The CPU 1 activates the control circuit (not shown) of the package 11 by using the control program and the driver that are stored in the ROM 11 to establish and exercise control of the package 11.

As a result, the package 11 can perform the line control function and the system interface function.

[Problem to be solved by the Invention]

For this conventional package controller, lines and facilities must be increased to expand a network. Thereafter, when more packages 11 must accordingly be provided, the driver for the controller 4 must also be expanded. If only the expansion of the package 11 is performed and there is no associated expansion of the driver, not only will the expanded package 11 be disabled, but also a run away condition of the CPU 1 will occur. Therefore, before expansion of the driver is performed, the entire system must temporarily be powered off; a halting of the system that can not be avoided.

This process is indispensable, especially for the expansion of a different type of package 11.

And since this operation is required, the system must be halted for an extended period of time.

It is, therefore, one objective of the present invention to provide a package controller that can, using a simple operation requiring only a short execution period, expand a package for an active system while maintaining the active state of the system,

and that can thereafter utilize the system.

[Means to solve the Problem]

To achieve the above objective, as is shown in the diagram of the principle in Fig. 1, a package controller comprises:

a controller 4 including a CPU 1, a main storage 2 and a system bus 3;

a memory 6 in which a driver 7 is stored; and

a package 5 connectable to the controller 4 through the system bus 3,

wherein, when the package 5 is connected to the system bus 3, the CPU 1 transfers the driver 7 from the memory 6 to the main storage 2, and permits the driver 7 to render the package 5 active.

[Operation]

According to the present invention, as shown in Fig. 1, when the package 5 is connected to the controller 4 and the memory 6 is connected to the system bus 3, the CPU 1 reads the driver 7 in the memory 6 and writes it in the main storage 2 for the controller 4. Then, under the control of the CPU 1, the driver 7 of the main storage 2 activates a control circuit (not shown) in the package 5. Through this processing, control of external sections, such as lines, is provided by the package 5.

Since the driver 7, which provides control for the package 5, is included in the package 5, even when, during the operation of the system, the package 5 is expanded, the controller 4 is unchanged. Therefore, the original control function can be implemented without halting the system.

[Embodiment]

Fig. 2 is a diagram showing a package controller according to one embodiment of the present invention. In this embodiment, a controller 4 includes a ROM 20 in which not only a control program (not shown) is stored, but also package connection monitoring software 21 for periodically monitoring a package address space.

A memory 6 for a package 5 is a memory card (a built-in ROM) that is used to store a driver 7, which is software incorporating an activation instruction for the package 5, and firmware 71, provided to supplement the driver 7. Further, the package 5 includes an MPU 51, which shares a part of the control with the CPU 1, and a system bus 52, which connects the MPU 51 and the memory 6 and which is connected to the system bus when the package 5 is attached to the controller 4. In this embodiment, the package 5 exercises line control.

The operation of this embodiment will now be described.

First, when the package 5 is attached to the controller 4, the system buses 3 and 52 are interconnected. The package connection monitoring software 21 in the ROM 20, which periodically scans the package address space, detects this connection of the system buses 3 and 52. Then, the CPU 1, in coordination with the MPU 51, transfers the driver 7 in the memory 6 to the main storage 2.

By using the driver 7 written in the main storage 2, the CPU 1 permits the MPU 51 and the firmware 71 to initialize and activate the package 5. Thus, the performance of line control by the package 5 is enabled.

Therefore, the software of the controller 4 need not be

changed, even when the package 5 is expanded, and a line control (or a system interface) function can be added without halting the system.

In this embodiment, a connected package has been detected by periodically monitoring the package address space. However, when a package is included as an attachment, an interrupt may be issued by the package to notify the CPU 1 that the package is connected.

[Advantage of the Invention]

As is described above, according to the package controller of the invention, since a driver for controlling a package is stored in the package, a software change of the controller is not required, regardless of whether the package to be expanded is the same or a different type. As a result, during package expansion, halting of the system can be avoided.

[Brief Description of the Drawings]

Fig. 1 is a block diagram showing the principle of a package controller according to the present invention;

Fig. 2 is a block diagram showing a package controller according to one embodiment of the present invention; and

Fig. 3 is a block diagram showing a conventional package controller.

In Fig. 1:

- 1 ... CPU
- 2 ... main storage
- 3 ... system bus
- 4 ... controller

5 ... package

6 ... memory

7 ... driver

The same reference numerals are used throughout to denote identical or corresponding components.

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[Fig. 1: diagram of the principle of the present invention]

- 2: main storage
- 3: system bus
- 4: controller
- 5: package
- 6: memory
- 7: driver

[Fig. 2: embodiment for the present invention]

- 2: main memory
- 3: system bus
- 4: controller
- 5: package
- 7: driver
- 21: package connection monitoring software
- 52: system bus
- 71: firmware

line

[Fig. 3: conventional example]

- 2: main storage
- 3: system bus
- 4: controller
- 10: ROM (driver)
- 11: package
- 12: memory

line